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COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS

Sub-Committee of Experts on the Transport of Dangerous Goods
(Fourteenth session,
Geneva, 8-19 December 1997,
agenda item 2 (d))

DRAFT AMENDMENTS TO THE MODEL REGULATIONS ON THE TRANSPORT OF DANGEROUS GOODS

Other draft amendments

Amendment to paragraph 2.5.3.2.4
List of currently assigned organic peroxide

Transmitted by the Expert from Japan

1. Introduction

According to the provision of paragraph 2.5.3.2.5.1, the after-mentioned organic peroxides and formulations of organic peroxides have been assigned to generic entries by the Ministry of Transport of Japan on the basis of test reports. Since these peroxide and formulations or organic peroxides have been transported in commercial amounts these years, there is a need to include these peroxides in the List of paragraph 2.5.3.2.4.

2. Proposal

Japan proposes to include the following organic peroxides and formulations of organic peroxides in the List of paragraph 2.5.3.2.4. The proposed list and the relevant supporting test data on the peroxides are given in Annexes 1 and 2 respectively.

DI-2-ETHOXYETHYL PEROXYDICARBONATE, not more than 52% in solvent

tert-HEXYL PEROXYPIVALATE, not more than 72% in solvent

DI-3-METHOXYBUTYL PEROXYDICARBONATE, not more than 52% in solvent

DI-m-TOLUOYL PEROXIDE + BENZOYL-m-TOLUOYL PEROXIDE + DIBENZOYL PEROXIDE, with concentration not more than 42% and not less than 58% of diluent Type B

DI-(2-ETHYLHEXYL)PEROXYDICARBONATE, with concentration not more than 62% as a stable dispersion in water

tert-BUTYL PEROXYNEODECANOATE, with concentration not more than 52% as a stable dispersion in water

2,2-BIS(4,4-DI-tert-BUTYLPEROXYCYCLOHEXYL)PROPANE, with concentration not more than 22% and diluent Type B

tert-HEXYL PEROXYNEODECANOATE, with concentration not more than 71% and diluent Type A

1,1-DI(tert-BUTYLPEROXY)-3,3,5-TRIMETHYLCYCLOHEXANE, with concentration not more than 77% and diluent Type B

* * * * *

(Annex 2 in English only)

Proposal

We propose to include the following organic peroxide in 2.5.3.2.4

ORGANIC PEROXIDE	Concentration (%)	Diluent type A (%)	Diluent Type B (%)	Packing Method	Control Temperature(℃)	Emergency Temperature(℃)	Number (Generic entry)
DI-2-ETHOXYETHYL PEROXYDICARBONATE	≦52		≧48	OP7	-10	0	3115
tert-HEXYL PEROXYPIVALATE	≦72	≧28		OP7	10	15	3115
DI-3-METHOXYBUTYL PEROXYDICARBONATE	≦52	≧48		OP7	-5	5	3115
DI-m-TOLUOYL PEROXIDE +BENZOYL-m-TOLUOYL PEROXIDE +DIBENZOYL PEROXIDE	TOTAL ≦42		≧58	OP7	35	40	3115
DI(2-ETHYLHEXYI) PEROXYDICARBONATE	≦62 as a stable dispersion in water			OP8	-15	-5	3117
tert-BUTYL PEROXYNEODECANOATE	≦52 as a stable dispersion in water			OP8	15	20	3117
2,2-bis(4,4-DI-tert-BUTYLPEROXY-CYCLOHEXYL)PROPANE	≦22		≧78	OP8			3107
tert-HEXYL PEROXYNEODECANOATE	≦71	≧29		OP7	10	15	3115
1,1-DI(tert-BUTYLPEROXY)-3,3,5-TRIMETHYLCYCLOHEXANE	≦77		≧23	OP7			3105

ANNEX 1

Annex 2

TEST REPORT

1. Name of the organic peroxide : DI-2-ETHOXYETHYL PEROXYDI-CARBONATE, not more than 52% in solvent

2. General data

2.1	Composition	: 50.3% di-2-ethoxyethyl peroxydicarbonate 49.7% diluent type B
2.2	Molecular formula	: $C_{10}H_{18}O_8$
2.3	Active oxygen content	: 3.03%
2.4	Physical form	: Liquid
2.5	Colour	: Colourless
2.6	Density	: 1013kg/m^3(0℃)

3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?

3.1	Method	: BAM 50/60 steel tube test(test A.1)
3.2	Sample conditions	: Ambient temperature
3.3	Observations	: Fragmented part of the tube : 14.7, 15.4 and 15.4 cm Only upper part was destroyed, no detonation
3.4	Result	: No
3.5	Exit	: 1.3

4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflagration?

4.1	Method 1	: Time/pressure test(test C.1)
4.2	Sample conditions	: Ambient temperature
4.3	Observations	: Time : 45.2ms
4.4	Result	: No
4.5	Method 2	: Deflagration test(test C.2)
4.6	Sample conditions	: 2℃
4.7	Observations	: Deflagration rate : 2.38mm/s
4.8	Result	: Yes, slowly
4.9	Final result	: Yes, slowly
4.10	Exit	: 5.2

5. Heating under confinement(test series E)
Box 8 of the flow chart : What is the effect of heating it under defined confinement?

5.1	Method 1	: Koenen test(test E.1)
5.2	Sample conditions	: Sample weight : 31.5g
5.3	Observations	: Limiting diameter : 1.0 mm flagmentation type "F"
5.4	Result	: Low

5.5	Method 2	: Dutch pressure vessel test(test E.2)
5.6	Sample conditions	: Sample weight 10g
5.7	Observations	: Limiting diameter 5.5 mm
5.8	Result	: Medium
5.9	Final result	: Medium
5.10	Exit	: 8.2

6. Thermal stability(outside of the flow chart : test series H)

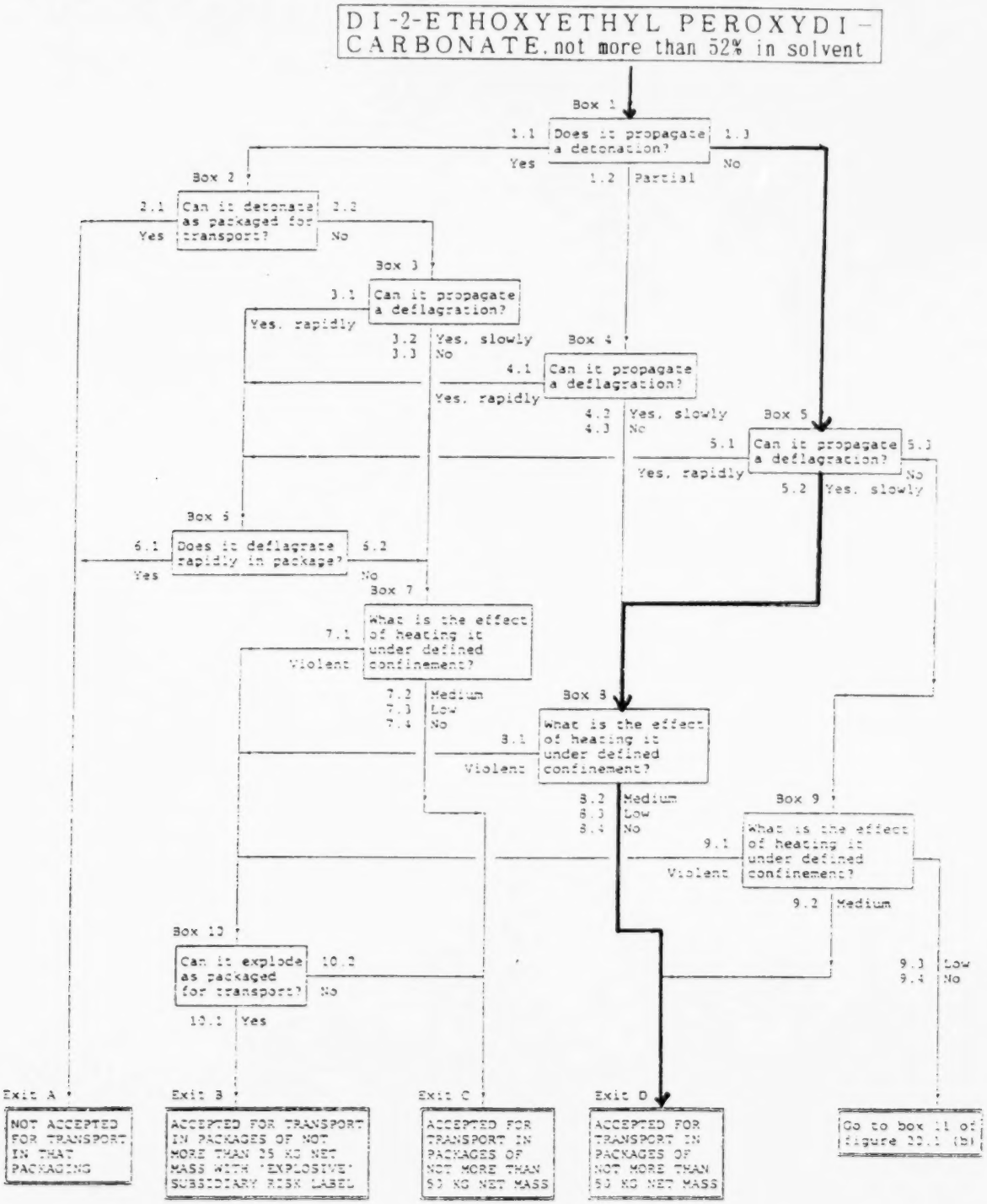
6.1	Method	: Heat accumulation strage test(test H.4)
6.2	Sample conditions	: Mass 400 cc: half time of cooling of dewar vessel=8.15 hours
6.3	Observation	: at 5℃ no exothermal reaction within 7 days at 10℃ temperature rise up to 168℃
6.4	Result	: SADT = 10℃

7 General remarks : The classification scheme is given in fig.1

8. Proposed assignment

8.1	Proper shipping name	: ORGANIC PEROXIDE TYPE D, LIQUID
8.2	UN number	: 3115
8.3	Division	: 5.2
8.4	Technical name	: DI-2-ETHOXYETHYL PEROXYDI-CARBONATE, not more than 52% in solvent
8.5	Concentration	: ≦52%
8.6	Diluent(s)	: Diluent type B
8.7	Subsidiary risks	: None
8.8	Packing group	: II
8.9	Packing method	: OP7
8.10	Control temperature	: -10℃
8.11	Emergency temperature	: 0℃

Fig. 1 CLASSIFICATION OF ORGANIC PEROXIDE MIXTURE



1. Name of the organic peroxide: tert-HEXYL PEROXYPIVALATE, not more than 72% in solvent

2. General data

2.1	Composition	: 70.4% t-Hexyl peroxypivalate 29.6% diluent type A
2.2	Molecular formula	: $C_{11}H_{22}O_3$
2.3	Active oxygen content	: 5.57%
2.4	Physical form	: Liquid
2.5	Colour	: Colourless
2.6	Density	: 878 kg/m^3(0℃)

3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation"

3.1	Method	: BAM 50/60 steel tube test(test A.1)
3.2	Sample conditions	: Ambient temperature
3.3	Observations	: Fragmented part of the tube: 11.0, 13.5 and 13.7 cm Only upper part was destroyed, no detonation
3.4	Result	: No
3.5	Exit	: 1.3

4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflaglation?

4.1	Method 1	: Time/pressure test(test C.1)
4.2	Sample conditions	: Ambient temperature
4.3	Observations	: Time : 145.2ms
4.4	Result	: Yes slowly
4.5	Method 2	: Deflagration test(test C.2)
4.6	Sample conditions	: 15℃
4.7	Observations	: Deflaglation rate : 2.27mm/s
4.8	Result	: Yes slowly
4.9	Final result	: Yes slowly
4.10	Exit	: 5.2

5. Heating under confinement(test series E)
Box 8 of the flow chart : What is the effect of heating it under defined confinement?

5.1	Method 1	: Koenen test(test E.1)
5.2	Sample conditions	: Sample weight : 25.7g
5.3	Observations	: Limiting diameter : 1.5 mm flagmentation type "F"
5.4	Result	: Medium

5.5	Method 2	: Dutch pressure vessel test(test E.2)
5.6	Sample conditions	: Sample weight 10g
5.7	Observations	: Limiting diameter : 5.0 mm
5.8	Result	: Medium
5.9	Final result	: Medium
5.10	Exit	: 8.2

6. Thermal stability(outside of the flow chart : test series H)

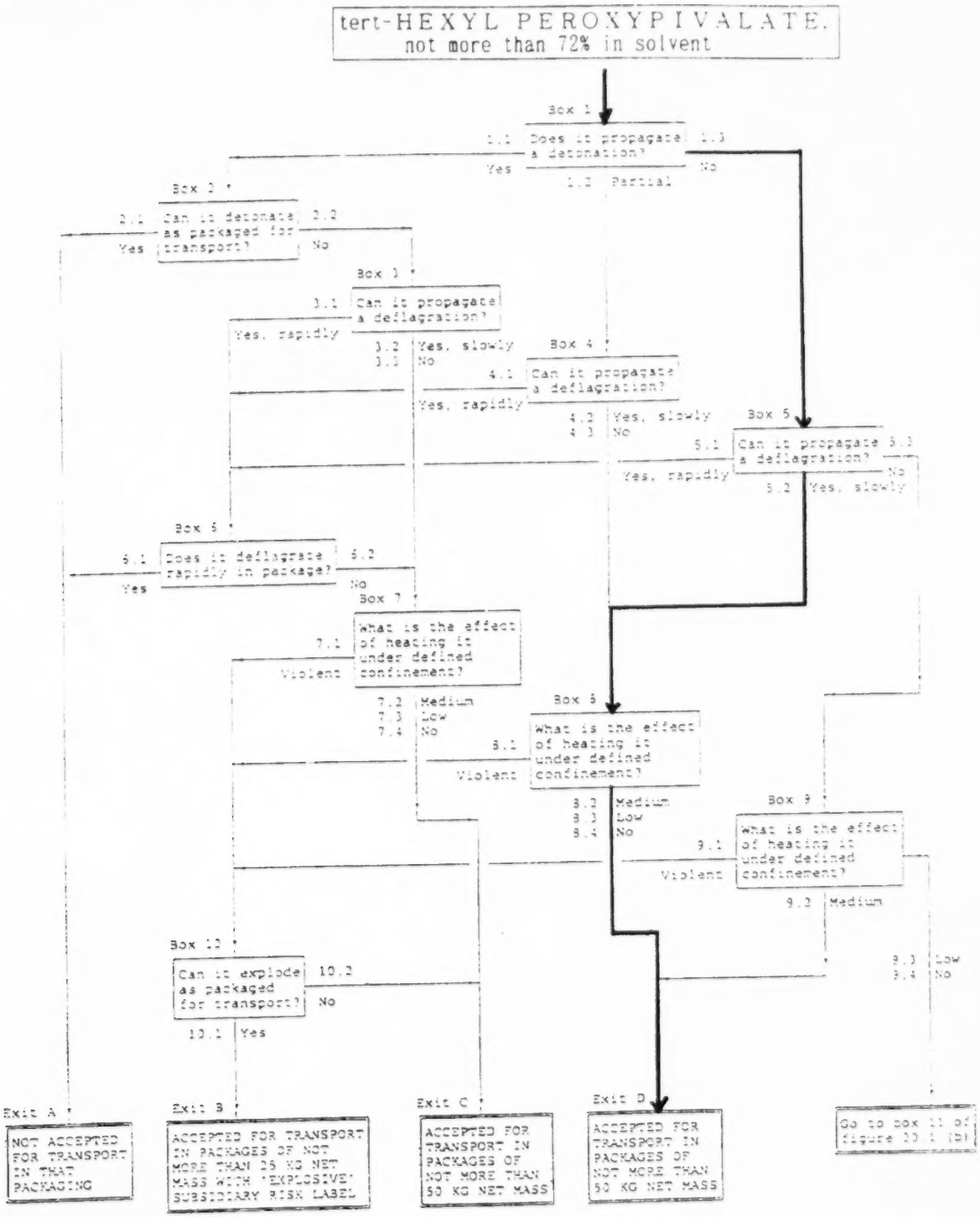
6.1	Method	: Heat accumulation strage test(test H.4)
6.2	Sample conditions	: Mass 400 cc: half time of cooling of dewar vessel=8.15 hours
6.3	Observation	: at 20℃ no exothermal reaction within 7 days at 25℃ temperature rise up to 128℃
6.4	Result	: SADT=25℃

7. General remarks : The classification scheme is given in fig.1

8. Proposed assignment

8.1	Proper shipping name	: ORGANIC PEROXIDE TYPE D. LIQUID
8.2	UN number	: 3115
8.3	Division	: 5.2
8.4	Technical name	: tert-HEXYL PEROXYPIVALATE. not more than 72% in solvent
8.5	Concentration	: ≦72%
8.6	Diluent(s)	: Diluent type A
8.7	Subsidiary risks	: None
8.8	Packing group	: Ⅱ
8.9	Packing method	: OP7
8.10	Control temperature	: 10℃
8.11	Emergency temperature	: 15℃

Fig. 1 CLASSIFICATION OF ORGANIC PEROXIDE MIXTURE



1. Name of the organic peroxide: DI-3-METHOXYBUTYLPEROXYDI-CARBONATE, not more than 52% in solvent

2. General data

2.1	Composition	: 50% di-3-methoxybutyl peroxydicarbonate 50% diluent type A
2.2	Molecular formula	: $C_{12}H_{22}O_8$
2.3	Active oxygen content	: 2.73%
2.4	Physical form	: Liquid
2.5	Colour	: Colourless
2.6	Density	: 995 kg/m^3(5℃)

3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?

3.1	Method	: BAM 50/60 steel tube test(test A.1)
3.2	Sample conditions	: Ambient temperature
3.3	Observations	: Fragmented part of the tube : 14.8, 14.9 and 15.7 cm Only upper part was destroyed, no detonation
3.4	Result	: No
3.5	Exit	: 1.3

4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflaglation?

4.1	Method 1	: Time/pressure test(test C.1)
4.2	Sample conditions	: Ambient temperature
4.3	Observations	: Max pressure : 1840KPa
4.4	Result	: No
4.5	Method 2	: Deflagration test(test C.2)
4.6	Sample conditions	: 7℃
4.7	Observations	: Deflaglation rate : 1.19mm/s
4.8	Result	: Yes slowly
4.9	Final result	: Yes slowly
4.10	Exit	: 5.2

5. Heating under confinement(test series E)
Box 8 of the flow chart : What is the effect of heating it under defined confinement?

5.1	Method 1	: Koenen test(test E.1)
5.2	Sample conditions	: Sample weight : 30.1g
5.3	Observations	: Limiting diameter : less than 1.0 mm flagmentation type "A"
5.4	Result	: Low

5.5	Method 2	: Dutch pressure vessel test(test E.2)
5.6	Sample conditions	: Sample weight 10g
5.7	Observations	: Limiting diameter : 2.0 mm
5.8	Result	: Low
5.9	Final result	: Low
5.10	Exit	: 8.3

6. Thermal stability(outside of the flow chart : test series H)

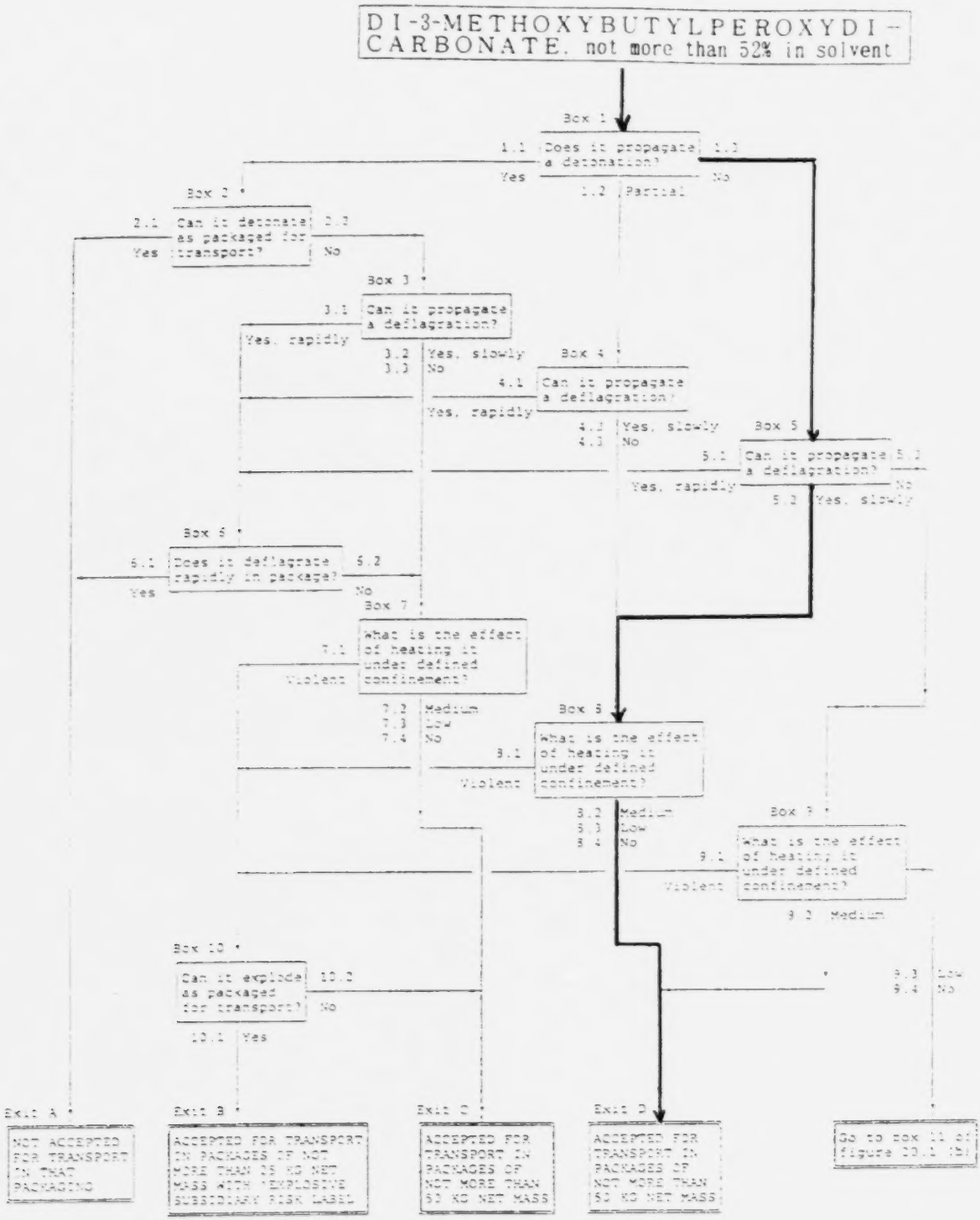
6.1	Method	: Heat accumulation strage test(test H.4)
6.2	Sample conditions	: Mass 400 cc: half time of cooling of dewar vessel=8.15 hours
6.3	Observation	: at 10℃ no exothermal reaction within 7 days at 15℃ temperature rise up to 173℃
6.4	Result	: SADT = 15℃

7. General remarks : The classification scheme is given in fig.1

8. Proposed assignment

8.1	Proper shipping name	: ORGANIC PEROXIDE TYPE D, LIQUID
8.2	UN number	: 3115
8.3	Division	: 5.2
8.4	Technical name	: DI-3-METHOXYBUTYLPEROXYDI- CARBONATE, not more than 52% in solvent
8.5	Concentration	: ≦52%
8.6	Diluent(s)	: Diluent type A
8.7	Subsidiary risks	: None
8.8	Packing group	: Ⅱ
8.9	Packing method	: OP7
8.10	Control temperature	: -5℃
8.11	Emergency temperature	: 5℃

Fig. 1 CLASSIFICATION OF ORGANIC PEROXIDE MIXTURE



1. Name of the organic peroxide : DI-m-TOLUOYL PEROXIDE + BENZOYL-m-TOLUOYL PEROXIDE + DIBENZOYL PEROXIDE. with concentration not more than 42% and not less than 58% of diluent Type B

2. General data

2.1	Composition	: 20% di-m-toluoyl peroxide 18% benzoyl-m-toluoyl peroxide 4% dibenzoyl peroxide 58% diluent type B
2.2	Molecular formula	: $C_{16}H_{14}O_4$, $C_{15}H_{12}O_4$, $C_{14}H_{10}O_4$
2.3	Active oxygen content	: 2.52%
2.4	Physical form	: Liquid
2.5	Colour	: Colourless or light yellow
2.6	Density	: 994 kg/m^3(0℃)

3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?

3.1	Method	: BAM 50/60 steel tube test(test A.1)
3.2	Sample conditions	: 33℃
3.3	Observations	: Fragmented part of the tube : 16.8 and 16.9 cm Only upper part was destroyed, no detonation
3.4	Result	: No
3.5	Exit	: 1.3

4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflaglation?

4.1	Method 1	: Time/pressure test(test C.1)
4.2	Sample conditions	: 22℃
4.3	Observations	: Time : No ignition
4.4	Result	: No
4.5	Method 2	: Deflagration test(test C.2)
4.6	Sample conditions	: 20℃
4.7	Observations	: Deflagration rate = 0.50mm/s
4.8	Result	: Yes slowly
4.9	Final result	: Yes slowly
4.10	Exit	: 5.2

5. Heating under confinement(test series E)
Box 8 of the flow chart : What is the effect of heating it under defined confinement?

5.1	Method 1	: Koenen test(test E.1)
5.2	Sample conditions	: -

5.3	Observations	: Limiting diameter : less than 1.0 mm flagmentation type "A"
5.4	Result	: Low
5.5	Method 2	: Dutch pressure vessel test(test E 2)
5.6	Sample conditions	: Sample weight 50g
5.7	Observations	: Limiting diameter : less than 1.0 mm
5.8	Result	: No
5.9	Final result	: Low
5.10	Exit	: 8.3

6. Thermal stability(outside of the flow chart : test series H)

6.1	Method	: Heat accumulation strage test(test H.4)
6.2	Sample conditions	: Mass 400 cc: half time of cooling of dewar vessel=5.2 hours
6.3	Observation	: at 40℃ no exothermal reaction within 7 days at 45℃ temperature rise up to 148℃
6.4	Result	: SADT = 45℃

7. Corrosivity(outside of the flow chart)

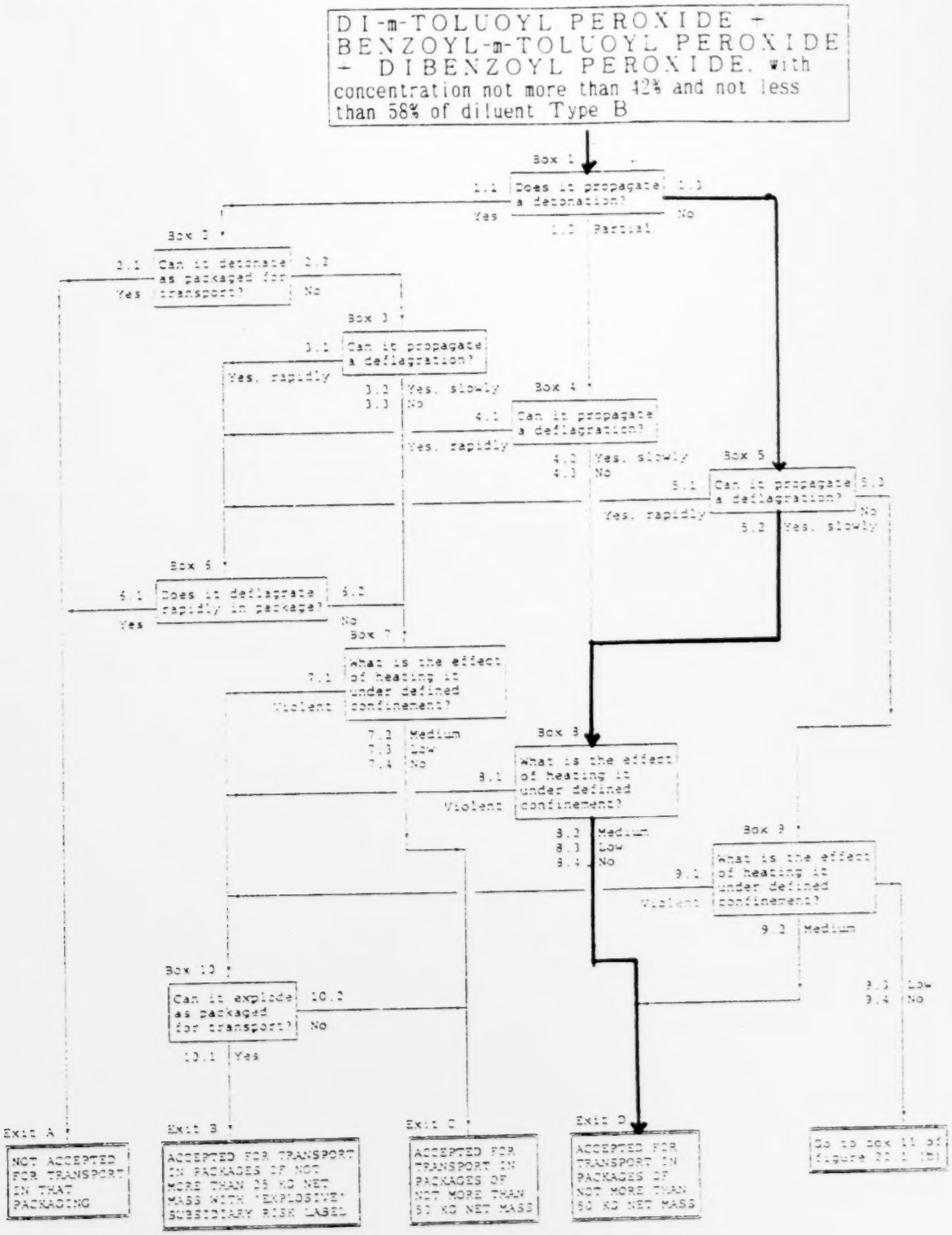
7.1	Method 1	: Acute dermal irritation/corrosion test(rabbit)
7.2	Observation	: After 14 days, no full destruction of intact skin is detected
7.3	Result	: Not corrosive
7.4	Method 2	: Corrosion rate on steel at 55℃
7.5	Observation and result	: Because of decomposition, this test is impossible
7.6	Final result	: Not corrosive

8. General remarks : The classification scheme is given in fig.1

9. Proposed assignment

9.1	Proper shipping name	: ORGANIC PEROXIDE TYPE D, LIQUID
9.2	UN number	: 3115
9.3	Division	: 5.2
9.4	Technical name	: DI-m-TOLUOYL PEROXIDE + BENZOYL-m-TOLUOYL PEROXIDE + DIBENZOYL PEROXIDE, with concentration not more than 42% and not less than 58% of diluent Type B
9.5	Concentration	: ≦42%
9.6	Diluent(s)	: Diluent type B
9.7	Subsidiary risks	: None
9.8	Packing group	: II
9.9	Packing method	: OP7
9.10	Control temperature	: 35℃
9.11	Emergency temperature	: 40℃

Fig. 1 CLASSIFICATION OF ORGANIC PEROXIDE MIXTURE


DI-m-TOLUOYL PEROXIDE + BENZOYL-m-TOLUOYL PEROXIDE + DIBENZOYL PEROXIDE, with concentration not more than 42% and not less than 58% of diluent Type B
Box 1
Does it propagate a detonation?
1.1 Yes
1.2 Partial
1.3 No
Box 2
Can it detonate as packaged for transport?
2.1 Yes
2.2 No
Box 3
Can it propagate a deflagration?
3.1 Yes, rapidly
3.2 Yes, slowly
3.3 No
Box 4
Can it propagate a deflagration?
4.1 Yes, rapidly
4.2 Yes, slowly
4.3 No
Box 5
Can it propagate a deflagration?
5.1 Yes, rapidly
5.2 Yes, slowly
5.3 No
Box 6
Does it deflagrate rapidly in package?
6.1 Yes
6.2 No
Box 7
What is the effect of heating it under defined confinement?
7.1 Violent
7.2 Medium
7.3 Low
7.4 No
Box 8
What is the effect of heating it under defined confinement?
8.1 Violent
8.2 Medium
8.3 Low
8.4 No
Box 9
What is the effect of heating it under defined confinement?
9.1 Violent
9.2 Medium
9.3 Low
9.4 No
Box 10
Can it explode as packaged for transport?
10.1 Yes
10.2 No
Exit A
NOT ACCEPTED FOR TRANSPORT IN THAT PACKAGING
Exit B
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 25 KG NET MASS WITH "EXPLOSIVE" SUBSIDIARY RISK LABEL
Exit C
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 50 KG NET MASS
Exit D
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 50 KG NET MASS
Go to box 11 of figure 20.1 (b)

1. Name of the organic peroxide : DI-(2-ETHYLHEXYL)PEROXYDI-CARBONATE, not more than 62% concentration as a stable dispersion in water

2. General data

2.1	Composition	: 62% di-(2-ethylhexyl)peroxydicarbonate 12% diluent type B 26% water and other additives
2.2	Molecular formula	: $C_{18}H_{34}O_6$
2.3	Active oxygen content	: 2.86%
2.4	Physical form	: Liquid
2.5	Colour	: Milky white
2.6	Density	: 990 kg/m^3(0℃)

3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?

3.1	Method	: BAM 50/60 steel tube test(test A.1)
3.2	Sample conditions	: 21℃
3.3	Observations	: Fragmented part of the tube : 11.0 and 14.5 cm Only upper part was destroyed, no detonation, sample remained.
3.4	Result	: No
3.5	Exit	: 1.3

4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflagration?

4.1	Method 1	: Time/pressure test(test C.1)
4.2	Sample conditions	: Ambient temperature
4.3	Observations	: No ignition
4.4	Result	: No
4.5	Method 2	: Deflagration test(test C.2)
4.6	Sample conditions	: 5.2℃
4.7	Observations	: No ignition
4.8	Result	: No
4.9	Final result	: No
4.10	Exit	: 5.3

5. Heating under confinement(test series E)
Box 9 of the flow chart : What is the effect of heating it under defined confinement?

5.1	Method 1	: Koenen test(test E.1)
5.2	Sample conditions	: Sample weight : 27.9g
5.3	Observations	: Limiting diameter : less than 1.0 mm flagmentation type "O"
5.4	Result	: No

5.5 Method 2 : Dutch pressure vessel test(test E.2)
5.6 Sample conditions : Sample weight 50g
5.7 Observations : Limiting diameter : less than 1.0 mm
5.8 Result : No

5.9 Final result : No
5.10 Exit : 9.4

6. Considering for transport in IBCs or tanks, or for exemption
Box 11 of the flow chart : Is the peroxide to be considered for transport in IBCs or tanks, or for exemption?

6.1 Result : No
6.2 Exit : 11.2

7. Thermal stability(outside of the flow chart : test series H)

7.1 Method : Heat accumulation strage test(test H.4)
7.2 Sample conditions : Mass 400 cc:
half time of cooling of dewar vessel=5.2 hours
7.3 Observation : at 0℃ no exothermal reaction within 7 days
at 5℃ temperature rise up to 93℃
7.4 Result : SADT = 5℃

8. Corrosivity(outside of the flow chart)

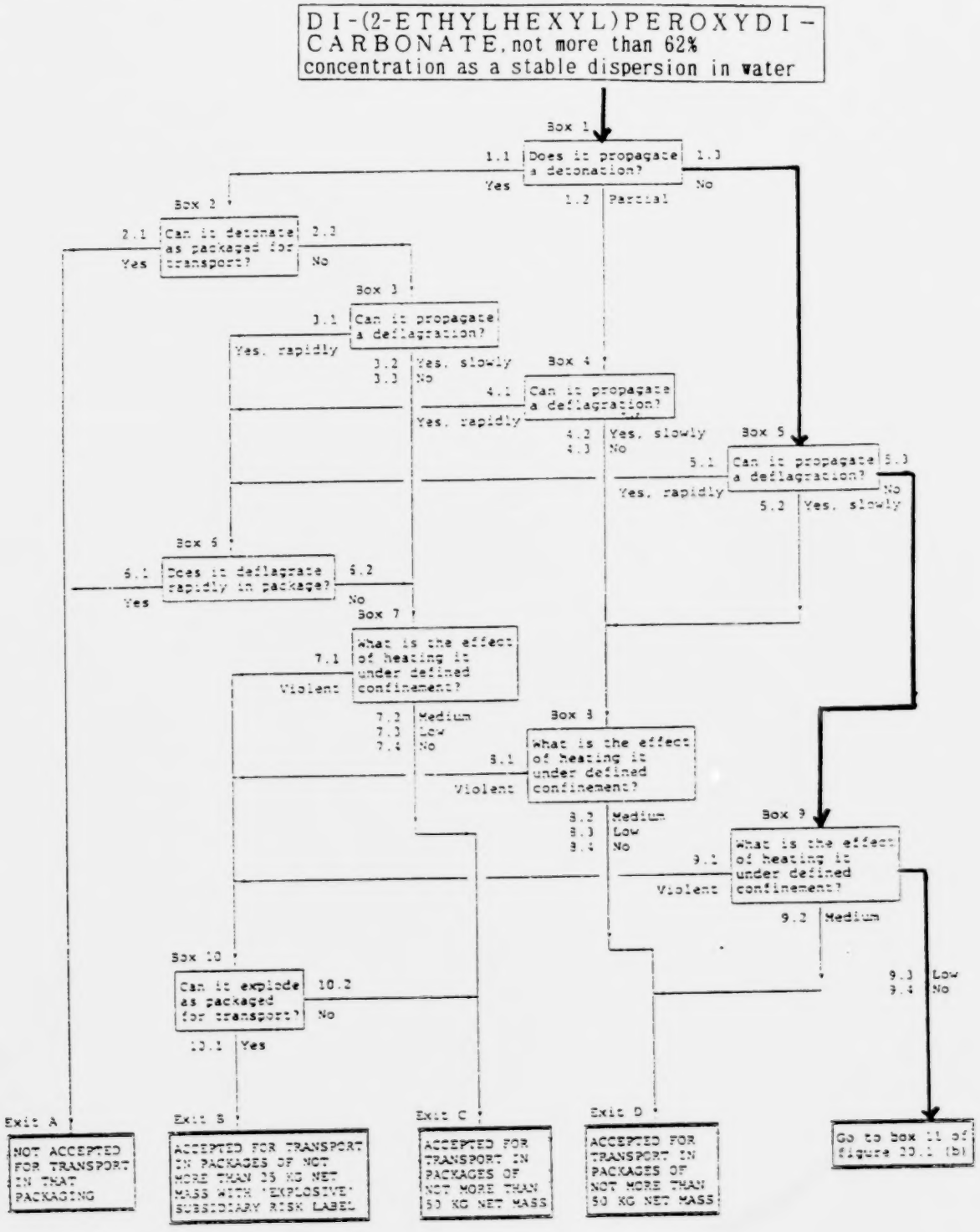
8.1 Method 1 : Acute dermal irritation/corrosion test(rabbit)
8.2 Observation : After 14 days, no full destruction of intact skin is detected
8.3 Result : Not corrosive
8.4 Method 2 : Corrosion rate on steel at 55℃
8.5 Observation and result : Because of decomposition, this test is impossible
8.6 Final result : Not corrosive

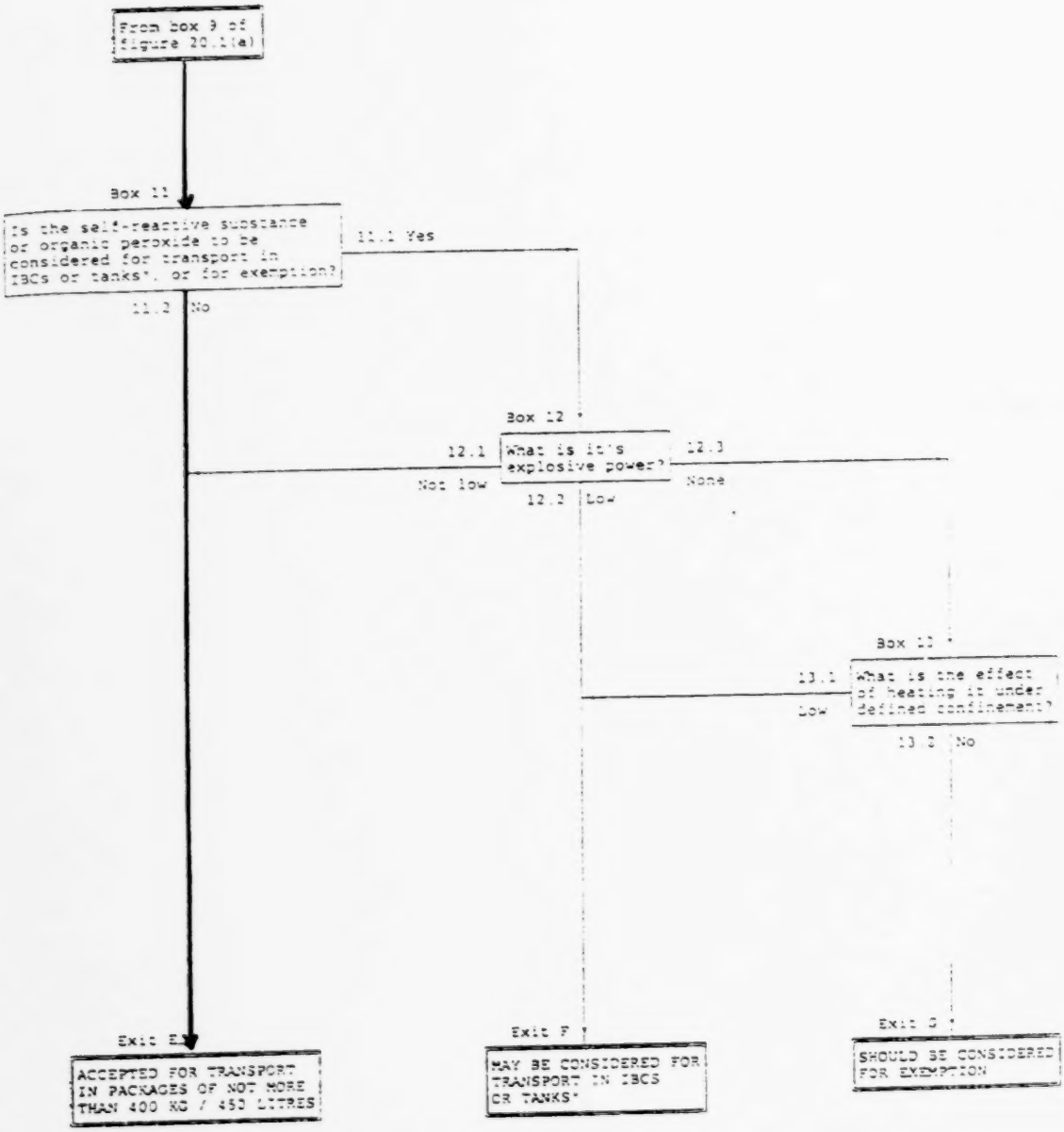
9. General remarks : The classification scheme is given in fig.1

10. Proposed assignment

10.1 Proper shipping name : ORGANIC PEROXIDE TYPE E, LIQUID
10.2 UN number : 3117
10.3 Division : 5.2
10.4 Technical name : DI-(2-ETHYLHEXYL)PEROXYDICARBONATE, not more than 62% concentration as a stable dispersion in water
10.5 Concentration : ≦62%
10.6 Diluent(s) : Diluent type B and water
10.7 Subsidiary risks : None
10.8 Packing group : Ⅱ
10.9 Packing method : OP8
10.10 Control temperature : -15℃
10.11 Emergency temperature : -5℃

Fig. 1 CLASSIFICATION OF ORGANIC PEROXIDE MIXTURE




From box 9 of figure 20.1(a)
Box 11
Is the self-reactive substance or organic peroxide to be considered for transport in IBCs or tanks*, or for exemption?
11.1 Yes
11.2 No
Box 12 *
What is it's explosive power?
12.1 Not low
12.2 Low
12.3 None
Box 13 *
What is the effect of heating it under defined confinement?
13.1 Low
13.2 No
Exit E
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 400 KG / 450 LITRES
Exit F *
MAY BE CONSIDERED FOR TRANSPORT IN IBCS OR TANKS*
Exit G *
SHOULD BE CONSIDERED FOR EXEMPTION

* At present, self-reactive substances may not be considered for transport in tanks

1. Name of the organic peroxide: tert-BUTYL PEROXYNEODECANOATE, not more than 52% concentration as a stable dispersion in water

2. General data

2.1	Composition	: 52% tert-butylperoxyneodecanoate 15% diluent type B 33% water and other additives
2.2	Molecular formula	: $C_{14}H_{24}O_3$
2.3	Active oxygen content	: 3.41%
2.4	Physical form	: Liquid
2.5	Colour	: Milky white
2.6	Density	: 942 kg/m^3(0℃)

3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?

3.1	Method	: BAM 50/60 steel tube test(test A.1)
3.2	Sample conditions	: 21℃
3.3	Observations	: Fragmented part of the tube : 4.5 and 6.0 cm Only upper part was destroyed, no detonation, sample remained.
3.4	Result	: No
3.5	Exit	: 1.3

4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflaglation?

4.1	Method 1	: Time/pressure test(test C.1)
4.2	Sample conditions	: Ambient temperature
4.3	Observations	: No ignition
4.4	Result	: No
4.5	Method 2	: Deflagration test(test C.2)
4.6	Sample conditions	: 30.1℃
4.7	Observations	: No ignition
4.8	Result	: No
4.9	Final result	: No
4.10	Exit	: 5.3

5. Heating under confinement(test series E)
Box 9 of the flow chart : What is the effect of heating it under defined confinement?

5.1	Method 1	: Koenen test(test E.1)
5.2	Sample conditions	: Sample weight : 26.2g
5.3	Observations	: Limiting diameter : less than 1.0 mm flagmentation type "O"
5.4	Result	: No

5.5 Method 2 : Dutch pressure vessel test(test E.2)
5.6 Sample conditions : Sample weight 50g
5.7 Observations : Limiting diameter : less than 1.0 mm
5.8 Result : No

5.9 Final result : No
5.10 Exit : 9.4

6. Considering for transport in IBCs or tanks, or for exemption
Box 11 of the flow chart : Is the peroxide to be considered for transport in IBCs or tanks, or for exemption?

6.1 Result : No
6.2 Exit : 11.2

7. Thermal stability(outside of the flow chart : test series H)

7.1 Method : Heat accumulation strage test(test H.4)
7.2 Sample conditions : Mass 400 cc:
half time of cooling of dewar vessel=5.2 hours
7.3 Observation : at 25℃ no exothermal reaction within 7 days
at 30℃ temperature rise up to 81℃
7.4 Result : SADT = 30℃

8. Corrosivity(outside of the flow chart)

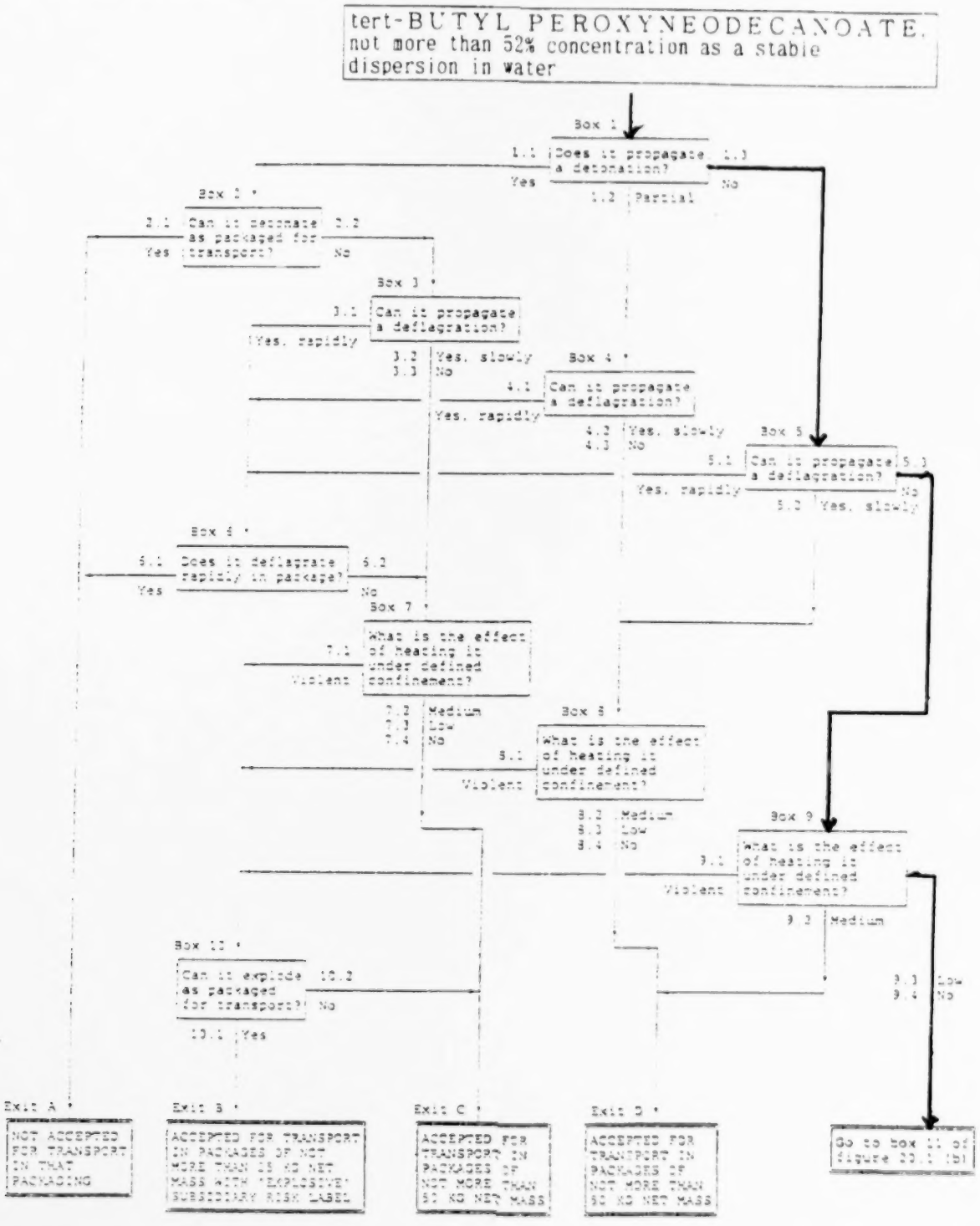
8.1 Method 1 : Acute dermal irritation/corrosion test(rabbit)
8.2 Observation : After 14 days, no full destruction of intact skin is detected
8.3 Result : Not corrosive
8.4 Method 2 : Corrosion rate on steel at 55℃
8.5 Observation and result : Because of decomposition, this test is impossible
8.6 Final result : Not corrosive

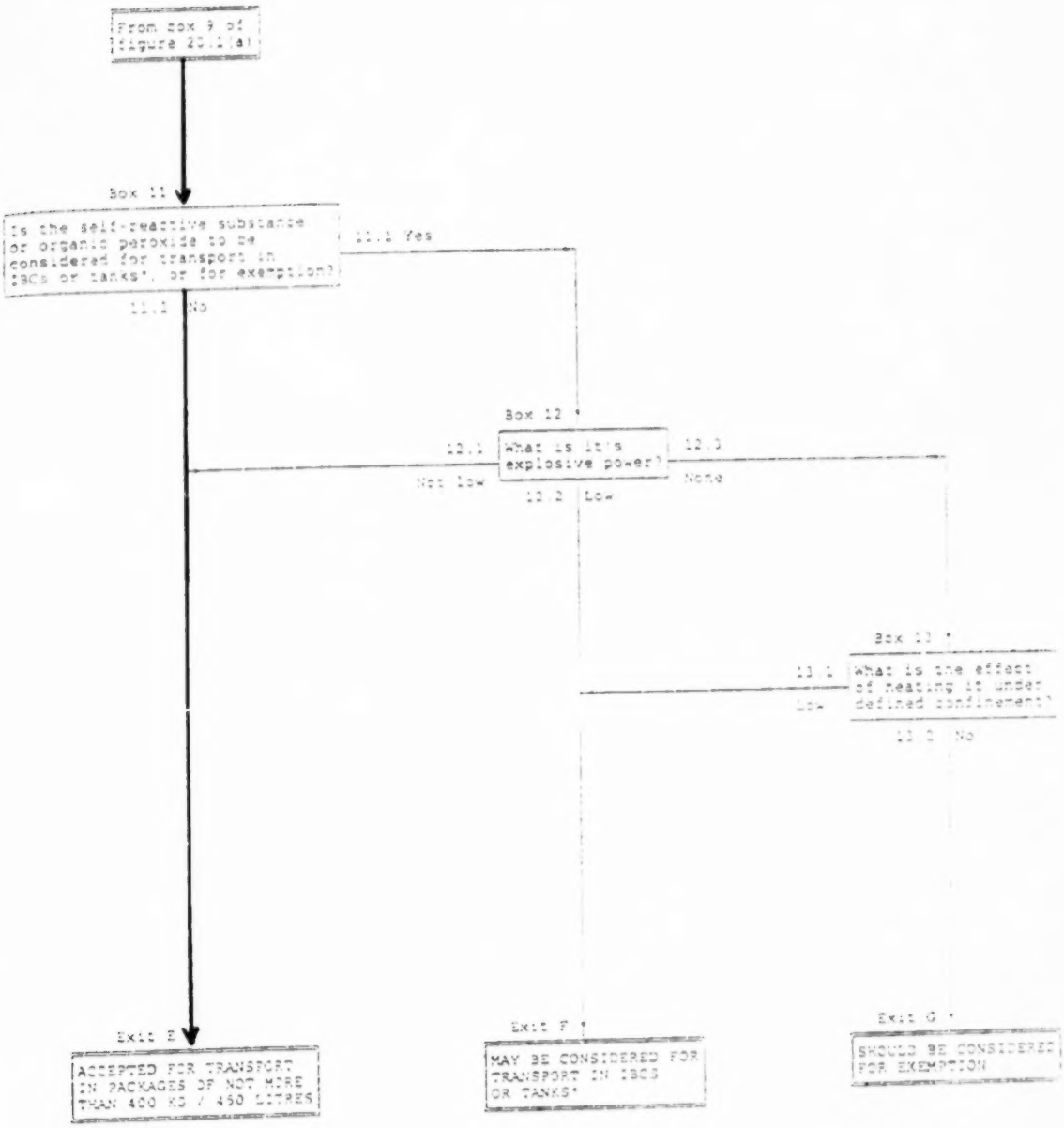
9. General remarks : The classification scheme is given in fig 1

10. Proposed assignment

10.1 Proper shipping name : ORGANIC PEROXIDE TYPE E, LIQUID
10.2 UN number : 3117
10.3 Division : 5.2
10.4 Technical name : tert-BUTYL PEROXYNEODECANOATE, not more than 52% concentration as a stable dispersion in water
10.5 Concentration : ≦52%
10.6 Diluent(s) : Diluent type B and water
10.7 Subsidiary risks : None
10.8 Packing group : Ⅱ
10.9 Packing method : OP8
10.10 Control temperature : 15℃
10.11 Emergency temperature : 20℃

Fig. 1 CLASSIFICATION OF ORGANIC PEROXIDE DISPERSION


tert-BUTYL PEROXYNEODECANOATE, not more than 52% concentration as a stable dispersion in water
Box 1
1.1 Does it propagate a detonation? 1.3
Yes
1.2 Partial
No
Box 2 *
2.1 Can it detonate as packaged for transport? 2.2
Yes
No
Box 3 *
3.1 Can it propagate a deflagration?
Yes, rapidly
3.2 Yes, slowly
3.3 No
Box 4 *
4.1 Can it propagate a deflagration?
Yes, rapidly
4.2 Yes, slowly
4.3 No
Box 5
5.1 Can it propagate a deflagration? 5.3
Yes, rapidly
5.2 Yes, slowly
No
Box 6 *
6.1 Does it deflagrate rapidly in package? 6.2
Yes
No
Box 7 *
7.1 What is the effect of heating it under defined confinement?
Violent
7.2 Medium
7.3 Low
7.4 No
Box 8 *
8.1 What is the effect of heating it under defined confinement?
Violent
8.2 Medium
8.3 Low
8.4 No
Box 9
9.1 What is the effect of heating it under defined confinement?
Violent
9.2 Medium
9.3 Low
9.4 No
Box 10 *
10.1 Can it explode as packaged for transport? 10.2
Yes
No
Exit A *
NOT ACCEPTED FOR TRANSPORT IN THAT PACKAGING
Exit B *
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 25 KG NET MASS WITH 'EXPLOSIVE' SUBSIDIARY RISK LABEL
Exit C *
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 50 KG NET MASS
Exit D *
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 50 KG NET MASS
Go to box 11 of figure 20.1 (b)


From box 9 of figure 20.1(a)
Box 11
Is the self-reactive substance or organic peroxide to be considered for transport in IBCs or tanks*, or for exemption?
11.1 Yes
11.1 No
Box 12 *
What is its explosive power?
12.1 Not low
12.2 Low
12.3 None
Box 13 *
What is the effect of heating it under defined confinement?
13.1 Low
13.2 No
Exit E
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 400 KG / 450 LITRES
Exit F *
MAY BE CONSIDERED FOR TRANSPORT IN IBCS OR TANKS*
Exit G *
SHOULD BE CONSIDERED FOR EXEMPTION

* At present, self-reactive substances may not be considered for transport in tanks.

1. Name of the organic peroxide : 2,2-BIS(4,4-DI-tert-BUTYLPEROXY-CYCLOHEXYL)PROPANE, with concentration not more than 22% and diluent Type B

2. General data

2.1	Composition	: 22% 2,2-bis(4,4-di-tert-butylperoxycyclohexyl)propane 78% diluent type B
2.2	Molecular formula	: $C_{31}H_{60}O_8$
2.3	Active oxygen content	: 2.28%
2.4	Physical form	: Liquid
2.5	Colour	: Light yellow
2.6	Density	: 891 kg/m^3 (20℃)

3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?

3.1	Method	: BAM 50/60 steel tube test(test A.1)
3.2	Sample conditions	: 27℃
3.3	Observations	: Fragmented part of the tube : 14.4 and 16.6 cm Only upper part was destroyed, no detonation
3.4	Result	: No
3.5	Exit	: 1.3

4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflaglation?

4.1	Method 1	: Time/pressure test(test C.1)
4.2	Sample conditions	: 26℃
4.3	Observations	: Not reach to 2070KPa
4.4	Result	: No
4.5	Method 2	: Deflagration test(test C.2)
4.6	Sample conditions	: 50℃
4.7	Observations	: Deflaglation rate : 0.01mm/s
4.8	Result	: No
4.9	Final result	: No
4.10	Exit	: 5.3

5. Heating under confinement(test series E)
Box 8 of the flow chart : What is the effect of heating it under defined confinement?

5.1	Method 1	: Koenen test(test E.1)
5.2	Sample conditions	: Sample weight : 24.1g
5.3	Observations	: Limiting diameter : less than 1.0 mm flagmentation type "A"
5.4	Result	: Low

5.5	Method 2	: Dutch pressure vessel test(test E.2)
5.6	Sample conditions	: Sample weight 50g
5.7	Observations	: Limiting diameter : less than 1.0 mm
5.8	Result	: No
5.9	Final result	: Low
5.10	Exit	: 9.3

6. Considering for transport in IBCs or tanks, or for exemption
Box 11 of the flow chart : Is the peroxide to be considered for transport in IBCs or tanks, or for exemption?

6.1	Result	: No
6.2	Exit	: 11.2

7. Thermal stability(outside of the flow chart : test series H)

7.1	Method	: Heat accumulation strage test(test H.4)
7.2	Sample conditions	: Mass 400 cc; half time of cooling of dewarvessel=5.2 hours
7.3	Observation	: at 70℃ no exothermal reaction within 7 days at 75℃ temperature rise up to 135℃
7.4	Result	: SADT = 75℃

8. Corrosivity(outside of the flow chart)

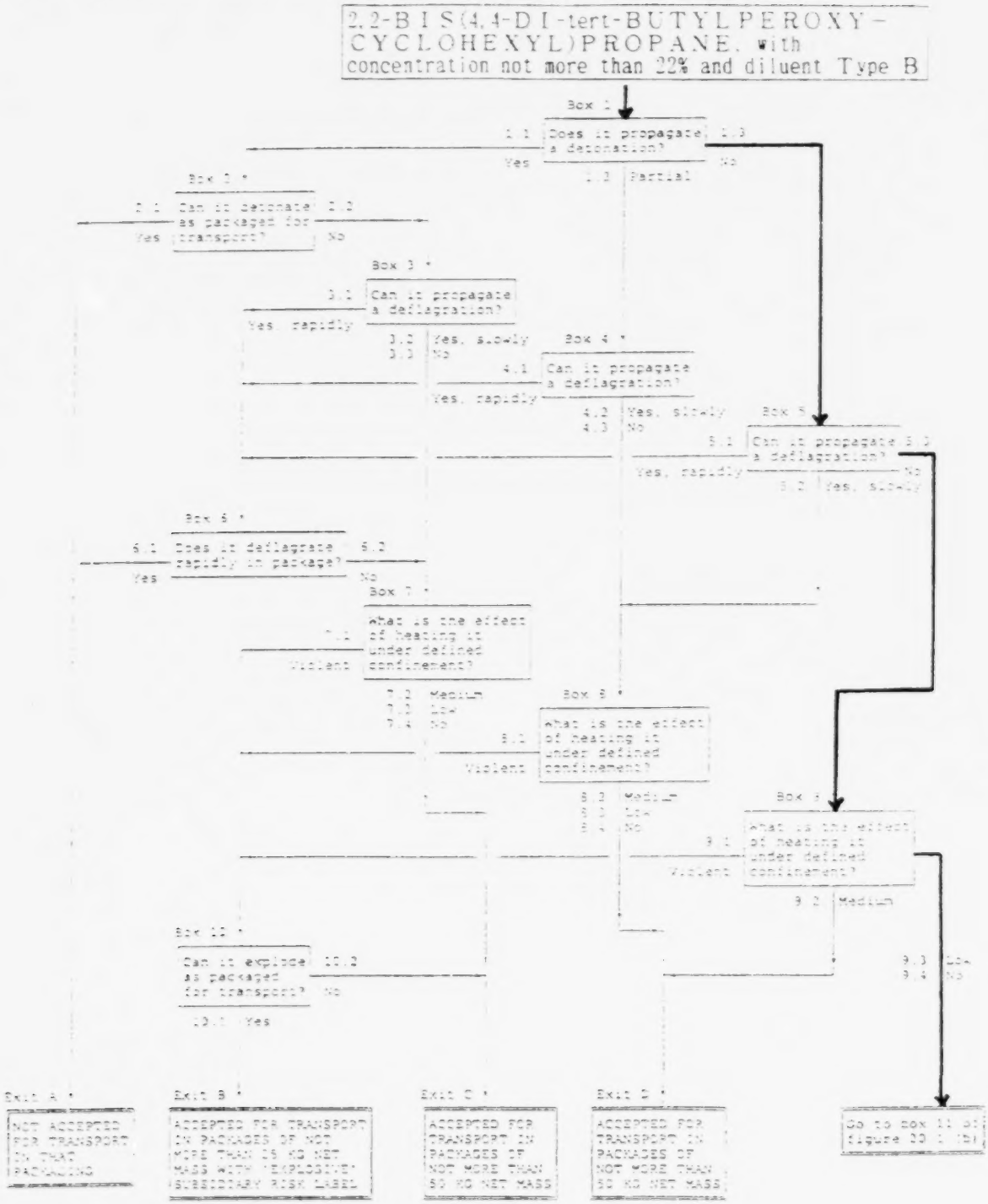
8.1	Method 1	: Acute dermal irritation/corrosion test(rabbit)
8.2	Observation	: After 14 days, no full destruction of intact skin is detected
8.3	Result	: Not corrosive
8.4	Method 2	: Corrosion rate on steel at 55℃
8.5	Observation	: Corrosion rate is 0 mm/year
8.6	Result	: Not corrosive
8.7	Final result	: Not corrosive

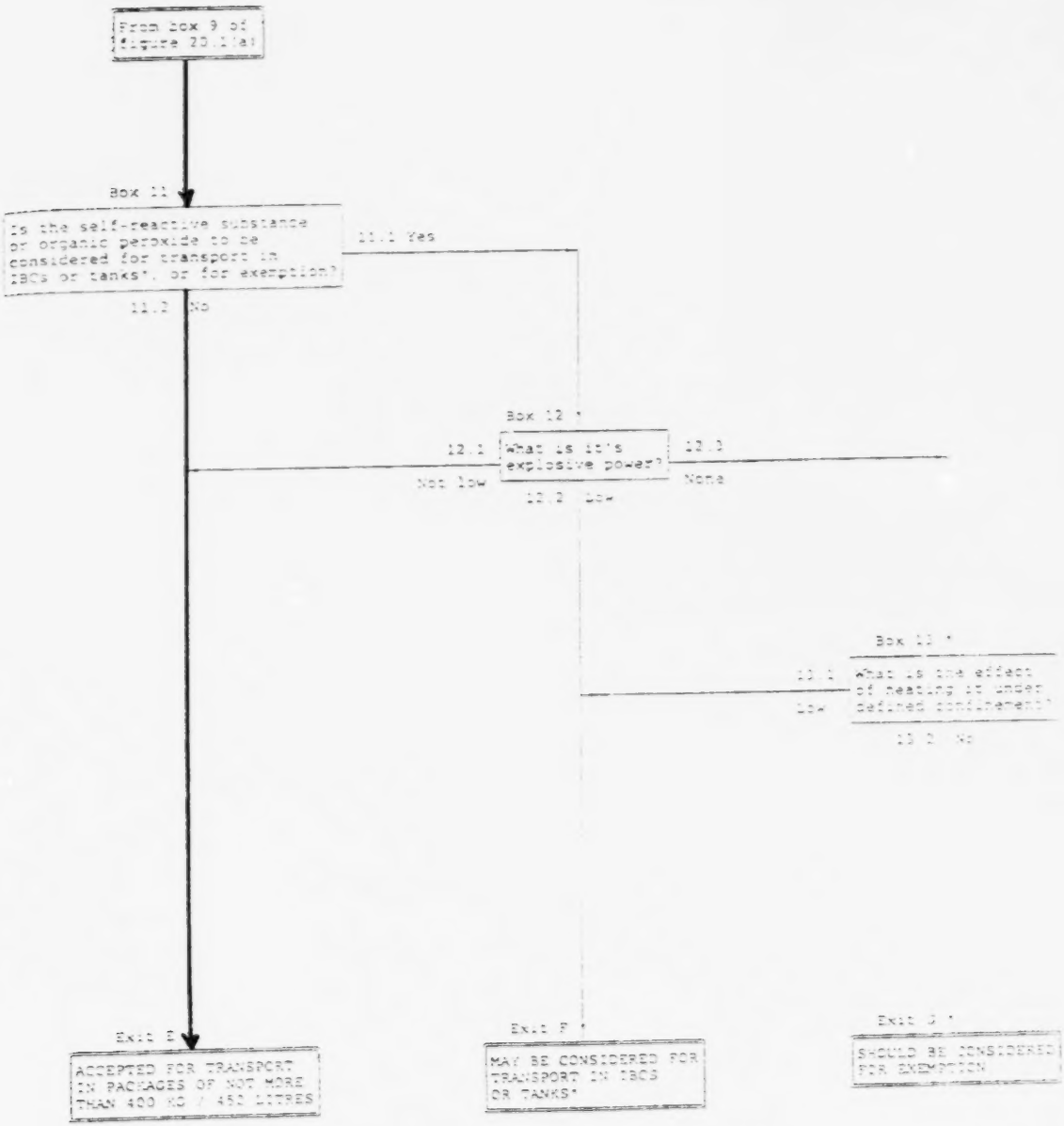
9. General remarks : The classification scheme is given in fig.1

10. Proposed assignment

10.1	Proper shipping name	: ORGANIC PEROXIDE TYPE E, LIQUID
10.2	UN number	: 3107
10.3	Division	: 5.2
10.4	Technical name	: 2,2-BIS(4,4-DI-tert-BUTYLPEROXY-CYCLOHEXYL)PROPANE, with concentration not more than 22% and diluent Type B
10.5	Concentration	: ≤22%
10.6	Diluent(s)	: Diluent type B
10.7	Subsidiary risks	: None
10.8	Packing group	: II
10.9	Packing method	: OP8
10.10	Control temperature	: Not required
10.11	Emergency temperature	: Not required

Fig. 1 CLASSIFICATION OF ORGANIC PEROXIDE DISPERSION


2,2-BIS(4,4-DI-tert-BUTYLPEROXY-CYCLOHEXYL)PROPANE, with concentration not more than 22% and diluent Type B
Box 1
1.1 Does it propagate a detonation? 1.3
Yes
No
1.2 Partial
Box 2 *
2.1 Can it detonate as packaged for transport? 2.2
Yes
No
Box 3 *
3.1 Can it propagate a deflagration?
Yes, rapidly
3.2 Yes, slowly
3.3 No
Box 4 *
4.1 Can it propagate a deflagration?
Yes, rapidly
4.2 Yes, slowly
4.3 No
Box 5
5.1 Can it propagate a deflagration? 5.3
Yes, rapidly
No
5.2 Yes, slowly
Box 6 *
6.1 Does it deflagrate rapidly in package? 6.2
Yes
No
Box 7 *
7.1 What is the effect of heating it under defined confinement?
Violent
7.2 Medium
7.3 Low
7.4 No
Box 8 *
8.1 What is the effect of heating it under defined confinement?
Violent
8.2 Medium
8.3 Low
8.4 No
Box 9
9.1 What is the effect of heating it under defined confinement?
Violent
9.2 Medium
9.3 Low
9.4 No
Box 10 *
10.1 Can it explode as packaged for transport?
Yes
10.2 No
Exit A *
NOT ACCEPTED FOR TRANSPORT IN THAT PACKAGING
Exit B *
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 25 KG NET MASS WITH 'EXPLOSIVE' SUBSIDIARY RISK LABEL
Exit C *
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 50 KG NET MASS
Exit D *
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 50 KG NET MASS
Go to box 11 of figure 10.1 (b)


From box 9 of Figure 20.1(a)
Box 11
Is the self-reactive substance or organic peroxide to be considered for transport in IBCs or tanks*, or for exemption?
11.1 Yes
11.2 No
Box 12 *
What is it's explosive power?
12.1 Not low
12.2 Low
12.3 None
Box 13 *
What is the effect of heating it under defined confinement?
13.1 Low
13.2 No
Exit E
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 400 KG / 450 LITRES
Exit F *
MAY BE CONSIDERED FOR TRANSPORT IN IBCS OR TANKS*
Exit G *
SHOULD BE CONSIDERED FOR EXEMPTION

* At present, self-reactive substances may not be considered for transport in tanks

1. Name of the organic peroxide : tert-HEXYL PEROXYNEODECANOATE, with concentration not more than 71% and diluent Type A

2. General data

2.1	Composition	: 71% tert-hexyl peroxyneodecanoate 29% diluent type A
2.2	Molecular formula	: $C_{16}H_{32}O_3$
2.3	Active oxygen content	: 4.17%
2.4	Physical form	: Liquid
2.5	Colour	: Colourless or light yellow
2.6	Density	: 872 kg/m^3 (0℃)

3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?

3.1	Method	: BAM 50/60 steel tube test(test A.1)
3.2	Sample conditions	: Ambient temperature
3.3	Observations	: Fragmented part of the tube : 17.3 to 19.6cm Only upper part was destroyed, no detonation
3.4	Result	: No
3.5	Exit	: 1.3

4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflaglation?

4.1	Method 1	: Time/pressure test(test C.1)
4.2	Sample conditions	: Ambient temperature
4.3	Observations	: No ignition
4.4	Result	: No
4.5	Method 2	: Deflagration test(test C.2)
4.6	Sample conditions	: 16.5℃
4.7	Observations	: Deflaglation rate : 0.37mm/s
4.8	Result	: Yes slowly
4.9	Final result	: Yes slowly
4.10	Exit	: 5.2

5. Heating under confinement(test series E)
Box 8 of the flow chart : What is the effect of heating it under defined confinement?

5.1	Method 1	: Koenen test(test E.1)
5.2	Sample conditions	: Sample weight : 26.1g
5.3	Observations	: Limiting diameter : less than 1.0 mm flagmentation type "A"
5.4	Result	: Low

5.5	Method 2	: Dutch pressure vessel test(test E.2)
5.6	Sample conditions	: Sample weight : 10g
5.7	Observations	: Limiting diameter : 3.5 mm
5.8	Result	: Medium
5.9	Final result	: Medium
5.10	Exit	: 8.2

6. Thermal stability(outside of the flow chart : test series H)

6.1	Method	: Heat accumulation strage test(test H.4)
6.2	Sample conditions	: Mass 400 cc half time of cooling of dewar vessel=8.15 hours
6.3	Observation	: at 20℃ no exothermal reaction within 7 days at 25℃ temperature rise up to 137℃
6.4	Result	: SADT = 25℃

7. Corrosivity(outside of the flow chart)

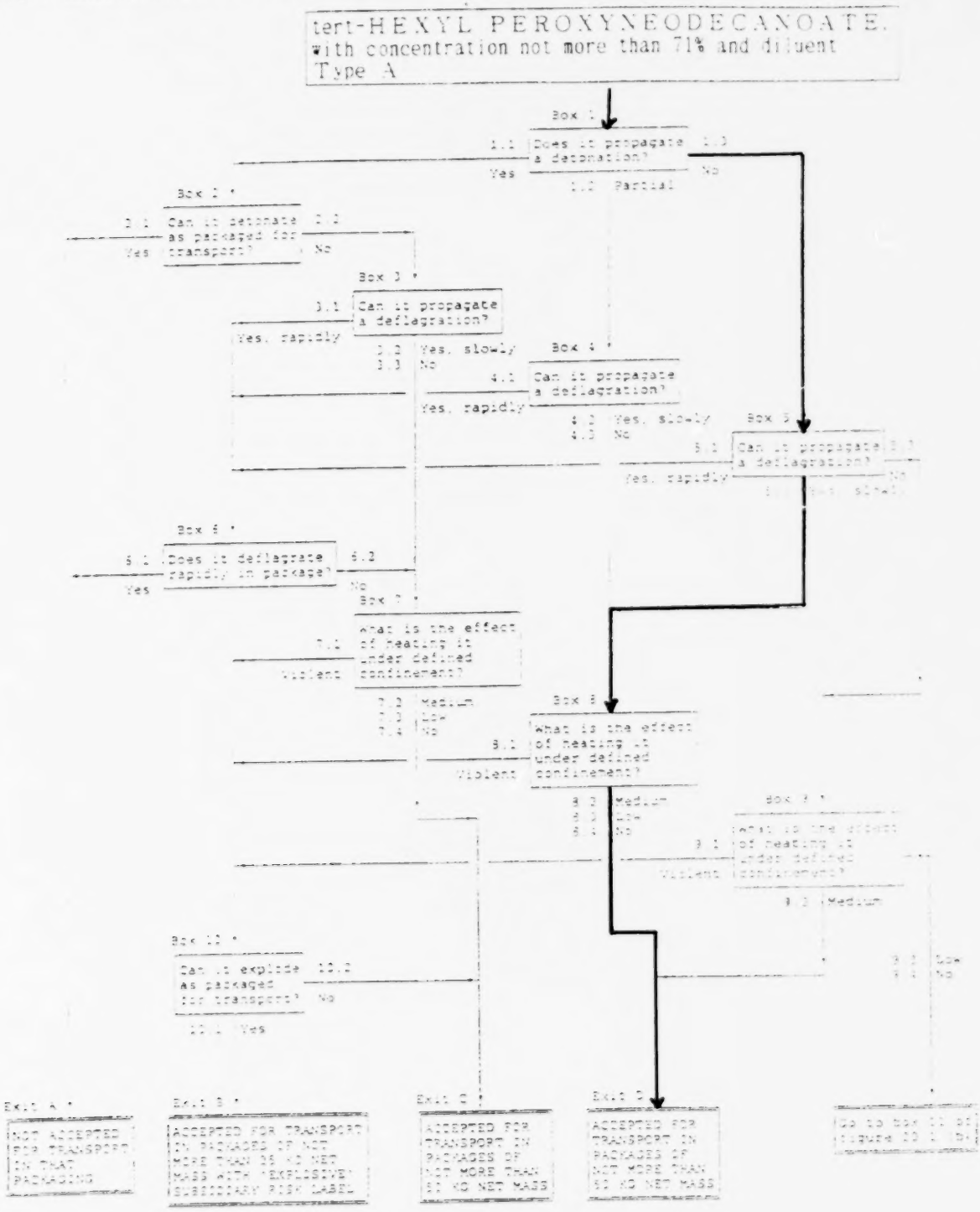
7.1	Method 1	: Acute dermal irritation/corrosion test(rabbit)
7.2	Observation	: After 14 days, no full destruction of intact skin is detected
7.3	Result	: Not corrosive
7.4	Method 2	: Corrosion rate on steel at 55℃
7.5	Observation and result	: Because of decomposition, this test is impossible
7.6	Final result	: Not corrosive

8. General remarks : The classification scheme is given in fig.1

9. Proposed assignment

9.1	Proper shipping name	: ORGANIC PEROXIDE TYPE D, LIQUID
9.2	UN number	: 3115
9.3	Division	: 5.2
9.4	Technical name	: tert-HEXYL PEROXYNEODECANOATE, with concentration not more than 71% and diluent Type A
9.5	Concentration	: ≦71%
9.6	Diluent(s)	: Diluent type A
9.7	Subsidiary risks	: None
9.8	Packing group	: II
9.9	Packing method	: OP7
9.10	Control temperature	: 10℃
9.11	Emergency temperature	: 15℃

Fig. 1 CLASSIFICATION OF ORGANIC PEROXIDE SOLUTION



1. Name of the organic peroxide : 1,1-DI(tert-BUTYLPEROXY)-3,3,5-TRI-METHYLCYCLOHEXANE, with concentration not more than 77% and diluent Type B

2. General data

2.1	Composition	: 77% 1,1-di(tert-butylperoxy)-3,3,5-trimethylcyclohexane 23% diluent type B
2.2	Molecular formula	: $C_{17}H_{34}O_4$
2.3	Active oxygen content	: 8.15%
2.4	Physical form	: Liquid
2.5	Colour	: Colourless or light yellow
2.6	Density	: 903 kg/m^3 (20℃)

3. Detonation(test series A)
Box 1 of the flow chart : Does the peroxide propagate a detonation?

3.1	Method	: BAM 50/60 steel tube test(test A.1)
3.2	Sample conditions	: 28℃
3.3	Observations	: Fragmented part of the tube : 15.1 and 16.2cm Only upper part was destroyed, no detonation
3.4	Result	: No
3.5	Exit	: 1.3

4. Deflagration(test series C)
Box 5 of the flow chart : Does the peroxide propagate a deflagration?

4.1	Method 1	: Time/pressure test(test C.1)
4.2	Sample conditions	: Ambient temperature
4.3	Observations	: No ignition
4.4	Result	: No
4.5	Method 2	: Deflagration test(test C.2)
4.6	Sample conditions	: Ambient temperature
4.7	Observations	: Deflagration rate : 0.45mm/s
4.8	Result	: Yes slowly
4.9	Final result	: Yes slowly
4.10	Exit	: 5.2

5. Heating under confinement(test series E)
Box 8 of the flow chart : What is the effect of heating it under defined confinement?

5.1	Method 1	: Koenen test(test E.1)
5.2	Sample conditions	: Sample weight : 24.4g
5.3	Observations	: Limiting diameter : 1.5 mm fragmentation type "F"
5.4	Result	: Medium

5.5 Method 2 : Dutch pressure vessel test(test E.2)
5.6 Sample conditions : 23°C, mass : 50 g
5.7 Observations : Limiting diameter : 1.0 mm
5.8 Result : Low

5.9 Final result : Medium
5.10 Exit : 5.2

6. Thermal stability(outside of the flow chart : test series II)

6.1 Method : Heat accumulation strage test(test H.4)
6.2 Sample conditions : Mass 400 cc;
half time of cooling of dewar vessel=5.2 hours
6.3 Observation : at 65°C no exothermal reaction within 7 days
at 70°C temperature rise up to 165°C
6.4 Result : SADT = 70°C

7 Corrosivity(outside of the flow chart)

7.1 Method 1 : Acute dermal irritation/corrosion test(rabbit)
7.2 Observation : After 14 days, no full destruction of intact skin is detected
7.3 Result : Not corrosive

7.4 Method 2 : Corrosion rate on steel at 55°C
7.5 Observation : Corrosion rate is 0 mm/year
7.6 Result : Not corrosive

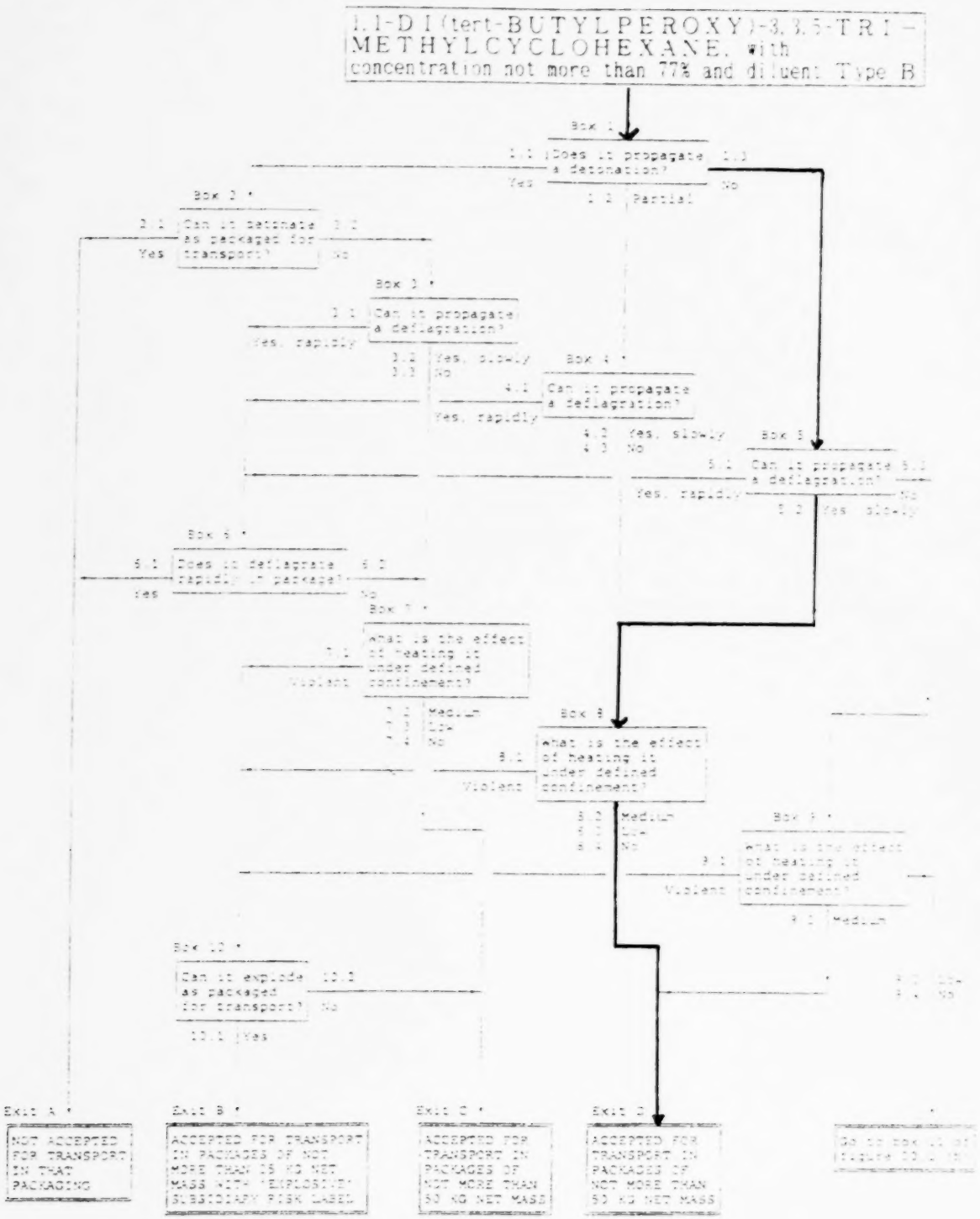
7.7 Final result : Not corrosive

8. General remarks : The classification scheme is given in fig.1

9. Proposed assignment

9.1 Proper shipping name : ORGANIC PEROXIDE TYPE D, LIQUID
9.2 UN number : 3105
9.3 Division : 5.2
9.4 Technical name : 1,1-DI(tert-BUTYLPEROXY)-3,3,5-TRI-METHYLCYCLOHEXANE, with concentration not more than 77% and diluent Type B
9.5 Concentration : ≦77%
9.6 Diluent(s) : Diluent type B
9.7 Subsidiary risks : None
9.8 Packing group : II
9.9 Packing method : OP7
9.10 Control temperature : Not required
9.11 Emergency temperature : Not required

Fig. 1 CLASSIFICATION OF ORGANIC PEROXIDE SOLUTION


1,1-DI(tert-BUTYLPEROXY)-3,3,5-TRI-METHYLCYCLOHEXANE, with concentration not more than 77% and diluent: Type B
Box 1
1.1 Does it propagate a detonation?
Yes
No
1.2 Partial
Box 2 *
2.1 Can it detonate as packaged for transport?
Yes
No
Box 3 *
3.1 Can it propagate a deflagration?
Yes, rapidly
3.2 Yes, slowly
3.3 No
Box 4 *
4.1 Can it propagate a deflagration?
Yes, rapidly
4.2 Yes, slowly
4.3 No
Box 5
5.1 Can it propagate a deflagration?
Yes, rapidly
No
5.2 Yes, slowly
Box 6 *
6.1 Does it deflagrate rapidly in package?
Yes
No
Box 7 *
7.1 What is the effect of heating it under defined confinement?
Violent
7.2 Medium
7.3 Low
7.4 No
Box 8
8.1 What is the effect of heating it under defined confinement?
Violent
8.2 Medium
8.3 Low
8.4 No
Box 9 *
9.1 What is the effect of heating it under defined confinement?
Violent
9.2 Medium
Box 10 *
10.1 Can it explode as packaged for transport?
Yes
No
Exit A *
NOT ACCEPTED FOR TRANSPORT IN THAT PACKAGING
Exit B *
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 25 KG NET MASS WITH 'EXPLOSIVE' SUBSIDIARY RISK LABEL
Exit C *
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 50 KG NET MASS
Exit D *
ACCEPTED FOR TRANSPORT IN PACKAGES OF NOT MORE THAN 50 KG NET MASS
Go to Box 11 of Figure 2 *